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Research Article

Is indigenous chicken rearing still profitable for the rural poor? - A case study of Jinaighati of Sherpur District in Bangladesh

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ABSTRACT

The aim of this study is to assess the profits of indigenous chicken rearing under better management practices at household level in Jinaghati upazila of Sherpur district. A total of 220 farm households surveyed taking 110 each from project and non-project households during January to February 2015 by interview a structured questionnaire. It is evident that the number of chicken per project and non-project households was 15.13 and 10.89 respectively of which 55.45% project and 35.00% non-project household had separate housing for chicken. Maximum family members both project and non project households were educated in primary level. About 25.0% project and 18.18% non-project household provide purchased feed and most of the both households arranged special laying management for chicken and hatched eggs by natural hatching system. Evidence also showed that 98.18% project households had training whereas only 2.00% in case of non-project households. The annual costs of production per bird were Tk. 149.32, Tk. 53.75, and Tk. 31.95 on full cost, variable cost and cash cost basis respectively in project household whereas Tk. 141.62, Tk. 54.80 and Tk. 19.71 respectively for the non-project household. The annual net return per bird over full cost, variable cost and cash cost basis were Tk. 277.71, Tk. 373.29 and Tk. 395.08 of the project household and Tk. 244.02, Tk. 330.84 and Tk. 365.94 for the non-project households. Profit from chicken rearing per household per year was accounted Tk. 4184.87 on full cost basis, Tk. 5630.92 on variable cost and Tk. 5977.63 on cash cost basis in project household. On the other hand, the net return per year was accounted Tk. 2649.87 on Full cost basis, Tk. 3595.37 on Variable cost and Tk. 3985.03 on cash cost basis for the non project household. The benefit cost ratios (BCR) were 1.86, 6.95 and 12.37 on full cost, variable cost and cash cost respectively in project household and 1.72, 6.04 and 18.57 for the non-project households. Results from the regression analysis showed that the co-efficient of housing, human labour, feed, equipment, transportation and flock size were positive and significant at 1.0% level implying that one unit increase for these inputs, keeping other factors constant, would result with an increase in profit per year by 0.214, 0.44, 0.157, 0.150, 0.194 and 0.144 unit, respectively in project households. In non-project household the co-efficient of housing cost, labour cost, marketing charge and age of the chicken keepers were positive and significant at 5.0% and 1.0% level implying that one unit increase for these inputs, keeping other factors constant, would result with an increase in profit per year by 0.230, 0.496, 0.430 and 0.158 units. The training to the rural people for rearing indigenous chicken and management, feed and flock size were strongly influenced on the profitability of indigenous chicken rearing in addition of having poultry shed and purchased feeds fed to them.

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1. INTRODUCTION

Indigenous chicken meat and eggs contribute 20-30% to the total animal protein supply in low-income and food-deficit countries (Moges et al., 2010). It provides employment and income generating opportunity and is a priority animal for holy days for religious sacrifices (Sonaiya 2000; Tadelle and Ogle 2001; Gueye 2003). Almost every family of rural Bangladesh is habituated in backyard poultry keeping and each household maintain about 6-16 chickens (Paul et al., 2003). Although the indigenous chickens are severely and negatively criticized mainly for their low productivity and unsuitability for commercial farming, prospects to explore higher productivity from them is great particularly under the "family poultry" farming system in addition to the value of conservation of their germplasm for the development of adaptable breeds in Bangladesh in the near future (Chowdhury 2014). Productive and reproductive performance of indigenous birds is relatively very low (35-40 eggs and 1-1.5 kg meat per bird per year), but genetic improvements by selective breeding, along with adequate nutrition and proper management, looks promising and quite possible. In-depth studies are needed for identification, selection, accumulation and conservation of such novel indigenous chicken genetic resources that are sporadically distributed in the country (Das et al., 2008).

A lot of rural poor women in different developing countries are engaged in indigenous chicken rearing (Dolberg 2004). The household chicken production system is the most familiar animal production system among poor households in the rural areas of the developing countries. It is a system in which the birds collected most of their feed from nature in free of cost, but it is not a system that generates a huge income. Interventions to improve these modest levels of production may be justified, as they contribute in helping women and their families in creating social capital and enter a positive spiral of events that may move them out of poverty (Jensen and Dolberg 2003). Small scale household chicken plays a significant role in improving the livelihood of resource poor farmers.

Earning from household poultry has a potential impact on total income. There is evidence that investments in small-scale poultry farming generate pretty returns and contribute to poverty reduction and increased food security in regions where a large share of the population keeps some poultry birds (Jensen and Dolberg 2003; Mack et. al., 2005; Pica? Ciamarra and Otte 2010).

In conventional farming, fast growing broiler birds are produced for meat purpose. Although they meet up the greater part of demand of poultry meat, these are still not suitable for organic production. Problems particularly in small-scale farming are quite common as the farmers often fail to ensure a bio-secure environment. In addition, one of the most important problems of such fast growing heavy weight birds at the present time are leg disorders and lameness which is questionable from a welfare perspective. Conversely, use of slow growing birds in organic production has positive repercussions on both welfare and product qualitative characteristics (eating quality and appearance) as perceived by consumers (Castellini et al., 2008). In the absence of strong regulatory body and enforcement of law and order in the country, harmful antibiotics, growth promoters and adulterated feeds are in use and therefore the commercial production of safe broiler and eggs for the consumers has become a challenging task. As a result, a section of consumers in Bangladesh has become interested to purchase poultry and poultry products either from known sources or from indigenous poultry resources. The meat and eggs of indigenous poultry are preferred widely by consumers because of their taste, leanness, and suitability for special dishes (Horst 1989). Although it cannot be claimed that the indigenous poultry are all reared in organic systems, it is generally agreed that they are comparatively safer at the present time and surpass industrial poultry on the grounds of quality characteristics making them more acceptable to the consumers and thus priced higher.

Human population in 2050 is estimated to be 9.15 billion, with a range of 7.96-10.46 billion (UNPD 2008). Most of the increase is projected to take place in developing countries (Thornton, 2010). The importance of backyard animals often increases as human population density increases. As human population density increases, small scale limited resource farmers tend to place more effort on animal production in order to increase food supply and cash income from their farms (Bishop 1995). The introduction of exotic breeds and other social and economic pressures have exposed locally adapted indigenous breeds to the risk of extinction and could lead to a loss of potentially valuable genetic diversity (Rege and Gibson 2003). Indigenous chicken is the important livestock species in Bangladesh, for which require less money, space and technological knowledge to rear. Maximum of the rural people have no capacity to rear high costing cross breed livestock species. Indigenous chicken is highly adapted to the

harsh conditions, poor nutrition and disease and/or parasite challenges. Over all the indigenous breeds are habituated with the environment of Bangladesh. The taste and preference of Bangladeshi people trend to indigenous livestock species and the price of indigenous species near about double in the market. So the rural people can easily rear some chicken at household level to meet the animal protein requirement. About 80% of egg production of the country comes from household poultry rearing. This study highlights the current indigenous chicken production circumstances in Bangladesh with a view to identifying the major challenges which need to be addressed in order to improve the indigenous chicken productivity and thereby improve the livelihood of the rural households.

By reviewing various research papers it is expected that there is some scope to study on the mentioned topics on the basis of some research questions that may be helpful for conservation as well as improvement of household chicken production. The research questions are:

- Chicken keepers are practicing different production systems but there is no in-depth information about the various production systems are practicing the chicken keepers in the study area?
- What is the profitability of household chicken rearing?
- What are the contributions to livelihoods of the chicken keepers through rearing indigenous goat and chicken?
- What interventions/ policy options can be promoted that would increase chicken owner's income and increase contribution to their livelihood?

Thus, the study is a modest effort to assess the profitability of household chicken rearing and measure the contribution of chicken income to the livelihood of chicken keepers in the study areas. The paper consists of four sections followed by the methods adopted in the following section. Section 3 describes the results and discussions of profitability and the contribution of household chicken income to the livelihood of the farmers. Finally conclusions and policy implications would be suggested.

2. METHODOLOGY

The aim of study is to investigate into a number of areas for which theoretical and conceptual frameworks, methodology and analytical techniques differ considerably. Selection of the study areas, sampling, geographic location of the study areas, characteristics of study areas, land use patterns and farming systems of the study areas, selection of the samples, preparation of the questionnaire, period of the study, selection and training of the enumerator, procedures and method of data collection and lastly data processing and analysis techniques are discussed in details in this section.

Data Source

Selection of study area for socio-economic study is very important. The study was conducted with the support of a project funded by UNEP-GEF-ILRI FAnGR. The project was implemented Jhinaigati Upazila under Sherpur district, thus, the Jhinaigati area was selected purposively for the study. Four villages namely: Rangtia, Shalchura under Nolkura union and Dudhnoi and Bongoan under gouripur union of Jhinaigati upazila were selected purposively for the study (Fig. 1). The commodity and as well as livestock market of the study area are mainly Jhenaigati bazar and Rangtia bazar. The villagers sell and buy their commodities as well as livestock product in those two markets. Livestock veterinary clinic also absent in the area. Educational institutes like Primary schools. Madrasha and High school are found in the area. Existences of extension services of the study area are limited. CARITAS- a NGO whose office is in the working area. But some NGOs are also working in the study area.

A baseline survey was conducted by the UNEP-GEF-ILRI FAnGR Asia Project to select the farmers for implementation of the project. Then, the UNEP-GEF-ILRI FAnGR Asia Project purposively selected 110 households in Jhinaigati site to implement chicken rearing systems respectively. The Geographic positioning Systems (GPS) device was used to locate and identify the households. Same number and same category of households was included from non project households for the study. Thus a total of 220 samples were selected purposively from four villages. Data were collected from project households and non-project household to measure the deviations between the project and non project households.

The survey questionnaires were developed in accordance with the objectives of the present research work. A series of discussions were done with the village leader in order to develop the appropriate survey questionnaires to collect necessary information from the community farmers. A draft questionnaire was prepared for testing by interviewing the farmers who were engaged in indigenous chicken. After pre testing the survey questionnaire, required

modification was done by adding the experience gathered during the pre testing period. The project was conducted during the period of Novermber 2009 to March 2015. In this study, the information mostly covered between January to December 2014 and data were collected during January to February 2015. Required data for the present study were collected by the researcher himself by using the pre-tested questionnaires. Data were collected both primary and secondary sources to fulfill the objectives of the study. Personal interview method was used to collect data from the chicken farmers using structured finalized interview schedule. Utmost care and caution was taken during data collection to get correct information to attain accuracy and reliability of data. Data of secondary sources was collected from various research publications, BBS and other authentic sources as per requirement of the study. All the collected data for the study was processed and analyzed using different software (Excel, SPSS etc). Both tabular and functional analyses were carried out in the study as applicable.

The costs and returns of raising chicken under traditional management systems were estimated for the present study. The total costs per farm per year were classified into cash costs and full costs. Cash costs were those costs, which the owner of chicken farms had to pay out of their pocket to pay for the inputs. On the contrary, full costs include both cash and non-cash costs. On the return side, gross return, net returns, returns over cash costs, and returns over full costs per farm were determined. The procedure of estimating major variable and fixed costs are briefly discussed below-

Variable costs in chicken farming at household level were found to be cost of feed, cost of vaccination, cost of treatment and cost interest on operating capital (IOC). All the costs, except IOC were calculated by taking into actual amount of costs incurred by the chicken keepers. Interest on operating capital was computed by taking all cash expenses incurred for various operations throughout the year in chicken rearing. Interest rate was assumed to be 12 percent per annum (Interest rate of saving accounts of commercial banks, 2016). The following formula was used to estimate the interest on operating capital:

$$\text{Interest on Operating Capital} = \frac{\text{Total operating capital} \times \text{Interest rate} \times \text{one year}}{2}$$

Fixed costs contained the cost of family labour, the value of opening stock, housing cost. Family labour included the farm operator him/herself and other member of the family for which no cash payment was made. To calculate the cost of family labour, the opportunity cost principle was applied.

Profit is defined as the difference between the value of goods and services produced by the farm and costs of resources used in production. In this study profit of chicken rearing were calculated by deducting total costs from total returns. Profitability of chicken rearing from the view point of individual farmer was measured in terms of gross return, gross margin, net return and benefit cost ratio (undiscounted). The various used formula for profitability calculation is discussed below:

Gross Return (GR)

Gross return was calculated by multiplying the total volume of output of an enterprise by the average price in the harvesting period. The following equation was used to estimate GR:

$GR_i = \sum Q_i P_i$

Where, GR_i =Gross return from i-th product; Q_i = Quantity of the i-th product; P_i = Average price of the i-th product; and i = 1, 2, 3.....n.

The net inventory changes was also considered in the gross returned and calculates the net inventory change = (Closing stock + sale + gift + eaten)- (Opening stock + purchase)

Gross Margin (GM)

Gross margin was calculated by the difference between gross return and total variable costs. Thus

GM = GR-TVC

Where, GM = Gross margin; GR = Gross return; and TVC = Total variable cost

Net Return/Profit (NR)

Net return/profit was calculated by deducting all costs (variable and fixed) from the gross return. To estimate the relative profitability of different agricultural enterprises, profit equation of the following algebraic form was used

$\Pi = \sum (P_{Yi}.Y_i) - \sum (PX_i.X_i) - TFC$

Where,

Π = Profit; P_{Yi}.=Price per unit of the i-th produce; Y_i = Quantity of the i-th produce; P_{Xi}. = Price per unit of the i-th inputs; X_i = Quantity of the i-th inputs; TFC = Total fixed costs; and I = 1, 2, 3.....n (number of items).

Benefit Cost Ratio (BCR)

The undiscounted benefit cost ratio (BCR) is a relative measure which was used to compare benefit per unit of cost. Benefit cost ratio (BCR) was estimated as a ratio of gross returns and gross costs. The formula for calculating BCR was used:

BCR =GR/TC

Where, GR =Gross return; TC = Total cost

Profit Function Analysis

Profit function analysis was carried out to examine the factors affecting the profitability of chicken rearing. The multiple regression profit model was used to estimate the direction and quantity of relationship between profit per household and variables affecting profit. The constructed regression profit model for chicken rearing was;

$Y = a + B_1X_1 + B_1X_2 + B_1X_3 + B_1X_4 + B_1X_5 + B_1X_6 + B_1X_7 + B_1X_8 + B_1X_9 + B_1X_{10} + B_1X_{11} + U$

Where: Y = Profit (Tk./household); X_1 = Housing cost (Tk/household); X_2 = Labour cost (Tk./household); X_3 = Feed cost (Tk./household); X_4 = Equipment cost (Tk./household); X_5 = Treatment cost (Tk./household); X_6 = Transportation cost (Tk./household); X_7 = Market charge (Tk./household); X_8 = Age of chicken keeper X_9 = Education level of chicken keeper; X_{10} = Experience of chicken rearing; X_{11} = No of birds per household; X_1, X_2.....Xn= Regressor variables; B1, B1..... Bn = Regression coefficients; a= Intercept and U= Disturbance term

3. RESULTS AND DISCUSSION

3.1 Profile of the Respondent Households

Socio economic profiles of the households are important in influencing production planning. People differ from one another in many respects. There are numerous interrelated and constituent attributes that characterize an individual and profoundly influence development of his/her behavior and personality. It was, therefore, assumed that production practices, profitability and contribution of factors on chicken income. The analysis and discussion of this chapter not being included in objectives of the present study but the concerned household condition and population characteristics are addressed here to help in describing and analyzing and also addressing the objectives set for the study.

Acceleration of indigenous chicken production economically empowers the rural youth and women (Guèye, 2009). There is potential for increasing production and productivity of indigenous chicken by promoting sound management practices (Dessie, 1996; Ndegwa et al., 1996c; Okitoi and Mukisira, 2001; Kingori et al., 2007). In this study, the average number indigenous chicken of the project and non-project households were found 15.13 and 10.89 respectively. Moreda et. al., (2013) found that the mean chicken flock size per household of the study area was (6.36) chickens. The mean chicken flock size in both project and non project area was higher than the result of the study of Moreda. The level of education is generally considered as an index of social advancement of any community. It was found that primary level education were the highest number of education level in both project and non project household where illiterate respondents were included 21.0% and 25.0% respectively (Table 1). No respondent was found at graduation and above level both project and non project household in the study area. The provision of good housing is a prerequisite for any viable and sustainable chicken project has been stressed (Smith, 1992). Proper housing does not only provide an environment that moderates environmental impact but also provides adequate ventilation for the birds to lay eggs in next boxes, as well as to feed and sleep in comfort and for security purposes (Yakubu, 2010). In this study it was observed that only 55.45% project and 35.00% non-project household had separate housing for chicken.

Chickens must be fed an adequate diet for maximum productivity. It was found that 25.0% project household and 18.18% non-project household provide purchased feed. Fully scavenge system was practiced by 8.18% project household and 18.18% non-project household. The study also revealed that both project and non project households arranged special laying management for chicken egg laying were arranged by 98.18 and 90.91% respectively (Table 1). Eggs were hatched by 99.0% project households and 95.45% by non project households.

Training is a process by which man become perfect in a production system and brings a change in their knowledge, skill and attitude. To make chicken production more profitable there was no alternative of training on chicken rearing. In project households, 98.18% had training whereas in non project households same percent (98.18%) had no training (Table 1) on chicken production method. The difference in receiving training among project and non project households was due to training arranged by World Vision Bangladesh and UNEP-GEF ILRI FAnGR Asia Project, Bangladesh Agricultural University.

Table 1. Socioeconomic profile of the indigenous chicken keeper's respondents

Parameters	Project		Non Project	
	No.	%	No.	%
Flock size (No./HH)	15.13	-	10.89	-
Primary Level & below	72	65.00	76	69.00
Having poultry shed	61	55.45	38	35.00
Purchased feed	27	24.55	20	18.18
Special care for egg laying	107	98.18	100	90.91
Hatching egg	109	99.0	105	95.45
Having training	108	98.18	2	1.82

Source: Field survey, 2015

3.2 Costs of Household Chicken Rearing

The purpose of this section is to calculate the costs, returns and profitability of indigenous chicken rearing at household level. There are different methods of estimating costs and returns such as gross margin analysis, cost analysis and return of indigenous chicken farming. In this study cost accounting method was used to determine costs and returns of indigenous chicken rearing. The cost items consist of housing, feed, feeder, watering, labour, transport, marketing, vaccination, deworming, treatment, interest on operating capital etc. On the return side value of product and by product were estimated in chicken farming. The total costs per household per year were calculated into fixed, variable and cash costs basis. On the return side gross return, net return above full cost, variable cost and cash cost were determined and analysed in this study.

3.2.1 Fixed cost

Fixed cost is those costs which don't vary on the volume of production. In the present study family labour, housing cost and equipment costs were considered in indigenous chicken rearing at household level.

Family labour

Labour is an important factor of any production process. In rearing indigenous chicken at household level only family labour was used. No hired labour was found in studied household. Opportunity cost principle was used to calculate the labour cost in household chicken rearing. Family labour cost was estimated Tk. 1197.63 in project household and Tk. 749.89 in non project households (Table 2) and their allocation to total cost were 52.62% in project household and 48.38% in non project household.

Cost of night shelter/housing

Housing is an important issue in indigenous chicken rearing. Really there was no appropriate shelter or housing for chicken in the study area. Some poultry keeper kept their chicken in separate house, but the houses not so hygienic for better production. Locally available materials were used to make houses. Depreciation method was used to calculate the cost of housing. The average night shelter cost per project household was Tk. 204.01 and Tk. 164.17 for non project household. Share of housing cost to total costs were estimated 8.96% and 10.59% in project and non project respectively (Table 2).

Cost of equipments

Every production process existence of equipments is very essential to make the production viable. In indigenous chicken production process the chicken keepers were habituated to use limited number of equipments in the study area. As equipments, feeding pot and water pot were considered in both project and non project households. Depreciation cost method was applied to determine equipments cost. The equipment cost per project household was Tk. 44.41 and in non project household was Tk. 31.45 whose share was 1.95% in project and 2.04% in non project household of their total cost (Table 2).

Chicken keeping fixed cost was estimated Tk. 1446.05 in project and Tk. 945.41 for non project household whose share 63.53% and 61.01% to total cost in project and non project household respectively (Table 2). Miah (2002) estimated fixed cost Tk. 1929.00 whose share was 34.20% of total yearly chicken production cost per household which differ findings of the present study.

3.2.2 Variable cost

A variable cost is a cost that varies in relation to changes in the volume of activity of a farm. In the present study feed cost, deworming cost, vaccination cost, veterinary service cost, marketing cost, transportation and interest on operating capital were considered as variable cost. Total variable cost per chicken keeping household per year was estimated Tk. 830.14 and Tk. 604.29 in project and non project household respectively. The share of variable cost to total was 36.47% in project and 38.99% in non project household (Table 2).

Feed cost

Indigenous chicken rearing managed mainly on scavenging with seasonal feed supplementation of home-grown grains and household food refusals. Feed from both home and purchase sources were feed chicken. Home supplied feed were paddy, rice, broken rice, rice bran. One the other hand purchased feed were ready feed, rice, broken rice and wheat bran. Total feed cost was estimated Tk. 565.55 in project household and Tk. 498.21 in non project household and their share was to total cost 24.85% and 32.15% in project and non project household (Table 2). The estimated home supplied feed cost was Tk. 317.71 and Tk. 376.79 and share was 13.96% and 24.31% to total cost in project and non project households respectively. Purchased feed cost was Tk. 247.84 and Tk. 121.42 and share was 10.89% and 7.83% respectively in project and non project household.

Deworming cost

Mainly project households practiced to de-worm their birds as per schedule guided by UNEP-GEF-ILRI FAnGR Asia Project. In non project households very limited no households practiced deworming to improve production of chickens. The deworming cost per project households per year was calculated Tk. 19.68 and for non project household Tk. 1.59 (Table 2). The share of deworming cost to total cost was 0.86% in project household and 0.10% in non project household.

Disinfectant cost

To keep the chicken house hygienic some chicken keeper used disinfectant. Mainly potash and lime was used as disinfectant by maximum household. The disinfectant cost was estimated Tk. 12.64 and 1.36 for project and non project household and their share found to total cost 0.56% and 0.09% respectively in project and non project households (Table 6.3).

Vaccination cost

Most of the project households in the study area vaccinated their chicken, but a few of non project households vaccinated their chicken. So the vaccination cost of project households was much higher than the non project household. Vaccination cost was calculated Tk. 97.68 per project households and only Tk. 2.23 for non project households (Table 2). Share of vaccination cost to total cost was 4.29% in project and 0.14% in non project households.

Veterinary and medicine cost

Veterinary cost incurred cost of medicine and the consultation fee for treatment. In the study area maximum chicken keeper were found to consult with the local medicine traders and purchased medicine according their advice. Veterinary and medicine cost were accounted Tk. 25.00 per project household and Tk. 33.30 for non project households. Share of vaccination cost to total cost was calculated 1.10% and 2.15% in project and non project household respectively Table 2).

Table 2. Production cost of chicken at household level

Cost item	Project		Non Project	
	Amount	%	Amount	%
A. Fixed cost				
a. Family labour	1197.63	52.62	749.79	48.38
b. Depreciation of shelter	204.01	8.96	164.17	10.59
c. Depreciation of equipment	44.41	1.95	31.54	2.04
Total Fixed cost (A)	1446.05	63.53	945.5	61.01
B. Variable cost				
a. Feed cost				
i) Home supplied				
Paddy home	10.55	0.46	8.15	0.53
Rice home	254.58	11.18	362.15	23.37
Broken rice home	39.35	1.73	6.2	0.40
Rice bran home	13.23	0.58	0.29	0.02
Home supplied Total (i)	317.71	13.96	376.79	24.31
ii) Purchased				
Ready feed	90	3.95	0	0
Rice purchase	114.65	5.04	113.78	7.34
Broken rice	24.09	1.06	5.36	0.35
Wheat bran	19.09	0.84	2.27	0.15
Purchased Total (ii)	247.84	10.89	121.42	7.83
Total feed cost (a= i+ii)	565.55	24.85	498.21	32.15
b. Deworming cost	19.68	0.86	1.59	0.10
c. Disinfectant cost	12.64	0.56	1.36	0.09
d. Vaccination cost	97.68	4.29	2.23	0.14
e. Veterinary service	25	1.10	33.3	2.15
f. Market cost	50.64	2.22	42.36	2.73
g. Transportation cost	29.95	1.32	12.36	0.80
h. Interest on operating capital	29.00	1.27	12.88	0.83
Total variable cost (B)	830.14	36.47	604.29	38.99
C. Total cost (A+B)	2276.19	100	1549.79	100
D. Total cash cost	483.43	21.4	214.62	13.92
E. Total cost (Tk/chicken/year)				
Full cost	150.44		142.31	
Variable cost	54.87		55.49	
Cash cost	31.95		19.71	

Source: Field survey, 2015

Market charge

Marketing charge was given by the chicken farmers for selling chicken and eggs at predetermined market places. The rate of market charge was determined by the market authority. Amount of market charge depends on the negotiation of seller, buyer and or the market authority. Market charge per year per household was accounted Tk. 50.64 for project households and Tk. 42.36 for non project households. The share of this cost to total cost was 2.22% and 2.73% in project and non project household (Table 2).

Transportation cost

Transportation cost was bearing for transferring chicken and eggs from home to market place for selling. Richsaw, van and auto rickshaw were the common means of transportation. Transportation cost per household per year was estimated Tk. 29.95 in favour of project households and Tk. 12.48 for non project households and share was 1.32% and 0.80% to total cost in project and non project household (Table 2).

Interest on operating capital
Interest on operating capital was considered if the chicken keeper deposit money in Bank and get the interest. Interest on operating capital was estimated Tk. 29.00 for project households and Tk. 12.88 for non project households and share of interest of operating capital cost to total cost was 1.27% in project and 0.83% in non project household correspondingly (Table 2).

Total cost
Household chicken rearing total variable cost per household was found Tk. 830.14 and 604.29 in project and non project households whose share was 36.47% and 38.99% to total cost in project and non project household. Total cash cost per household were estimated Tk. 483.43 and Tk. 214.74 in project and non project household and their share was to total cost 21.40% and 13.92% in project and non project households. Total cost per household was calculated Tk. 2276.19 and Tk. 1549.79 in project and non project household respectively. Miah (2002) found total variable cost Tk. 3716.00, total cost Tk. 5645.00 and total cash cost Tk. 1116.00 for chicken keeping household per year and their share were 65.80%, 100% and 19.80% to total cost respectively.

Costs per chicken per year were found Tk. 150.44 on full cost basis, Tk. 54.87 on variable cost basis and Tk. 31.95 on cash cost basis in project households. In the non project household costs per chicken per year were estimated Tk. 142.31, Tk. 55.49 and Tk. 19.71 on full cost, variable cost and cash cost basis respectively (Table 6.3). Miah (2002) reported that production cost of chicken per year was estimated TK. 372.00, Tk. 245.00 and Tk. 74.00 on full, variable and cash cost basis. Oladunni and Fatuase (2014) revealed that the cost of production per bird was N3,987.52 in Nigeria. The findings of Miah (2000), Oladunni and Fatuase (2014) differ from the findings of the present study.

3.3 Returns from Chicken Rearing
Return from chicken rearing was the summation of return from chicken, return from eggs and value of droppings that was used by the chicken keepers in various productive purposes.

3.3 Return from chicken
Return from chicken was estimated by the value of inventory change of chicken and the value of chicken litter/droppings. The following sub-section is illustrated at the below:

Return from inventory change
Inventory change was defined as the difference between the total value of farm's chickn at the beginning of the year plus chicken bought and the total value of farm's chicken at the end of the year plus chicken sold, chicken gifted/share out, and chicken consumed. The form of inventory change was calculated accordingly Miah (2002): Inventory change= (Closing stock + Sold +Gift/share out + Eaten) - (Opening stock + Purchased).

Inventory change per chicken keeping households was estimated Tk. 5081.09 in project household and Tk. 3283.23 in non project household whose share was 78.81% in project household and 78.18% in non project household of gross return (Table 3). Miah (2002) found inventory change in chicken rearing household was Tk. 1712.00 and share to total return was 30%.

Return from litter/droppings
Actually no household sold their droppings but they used it for various production practices in the study area. Opportunity cost principle was used for determining return from droppings/litter. Return from droppings was Tk.103.00 for project households and Tk. 57.91 for non project households. The share of droppings income to gross income was 1.60% in project and 1.38% in non project household (Table 3).

Return from egg
Returns from egg was estimated by adding the value of eggs consumed plus value eggs sale plus value of eggs distributed and the value of eggs for hatching etc. Return from egg per household per year was estimated Tk.1263.20 for project households and Tk. 858.53 for non project households. The share of total egg income to total income was 19.59% in project and 20.44% in non project household (Table 3).

Sale of egg
Sale of eggs was calculated Tk.452.69 for project household and Tk. 134.96 for non project households and share of egg sale income to total income was 7.02% in project and 3.21% in non project household (Table 3).

Consumption of egg
Consumption value of eggs per household per year was determined Tk.417.04 for project households and Tk. 346.44 for non project households. The share of consumption value to gross return was 6.47% in project and 8.25% in non project household (Table 3).

Gift of egg to the neighbored and relatives
Distribution value of eggs per household per year was determined Tk.17.85 for project households and Tk. 12.76 for non project households whose share was 0.28% and 0.30% to gross return in project and non project household (Table 3).

Hatching of egg
In the study area chicken keeper practiced natural hatching with their own hens. The hatching value of eggs per household per year was determined Tk.

375.63 for project households and Tk.364.36 for non project households. Share of hatching egg value to gross return was 5.83% in project household and 8.68% in non project household (Table 3).

Gross return from chicken rearing

Total return from egg was estimated Tk. 1263.20 in project household and Tk. 858.53 in on project household. The share of egg income to gross return was calculated 19.59% and 20.44% in project and non project household respectively. Farooq and Mian (2001) found that members earned higher household annual cash income from the sale of eggs (Rs. 2038.19), than non-member farmers (Rs. 1040.88) in Pakistan. Farooq et al., (2002) revealed that annual household gross income from eggs of backyard fowl was Rs. 3028.82. Average yearly gross return from chicken rearing per project household per year was estimated Tk. 6447.29 and Tk. 4199.66 in non project household (Table 3). Gross return per chicken per year was estimated Tk. 426.13 for project and Tk.385.64 for non project households. Miah (2002) found gross return from chicken rearing was Tk. 5767.00 and gross return per bird per year Tk. 380.00. Braker et. al., (2002) in South Africa disclosed that economic values based on gross margin calculations were R864 in Jericho, R382 in Bolahlakgomo and R1, 569 in Schoonoord. Farooq and Mian (2001) reported higher household annual gross (Rs. 6457.41) and cash income (Rs. 2877.86) was obtained by member versus non-member farmers (Rs. 4871.75 and Rs. 2072.48, respectively. Similarly higher household annual gross (Rs. 2150.70) and cash income (Rs. 946.95) was obtained from Desi (nondescript indigenous) fowls than from white Leghorn (WLH; Rs. 282.95 and Rs. 131.20, respectively. Higher gross and cash income was obtained from Rhode Island Red (RIR) fowls under backyard conditions than Fayumi and WLH fowls. Farooq et al., (2002) found total household gross and cash income from backyard fowl (including eggs) was Rs. 6213.98 and Rs. 2202.70 respectively. Oladunni and Fatuase (2014) revealed that the revenue per bird were N4, 210.11 with the gross margin and profit of N537.99 and N222.59 per bird respectively which indicated that the enterprise is profitable.

Table 3. Return from chicken rearing at household level

(Taka/Year)

Particular	Project		Non Project	
	Amount	%	Amount	%
A. Return from chicken				
a. Return from inventory change	5094.86	78.85	3283.23	78.18
b. Return from litter	103.00	1.59	57.91	1.38
Total return from chicken (A)	5197.86	80.45	3341.14	79.56
B. Return from egg				
a. Egg sale	452.69	7.01	134.96	3.21
b. Egg consumption	417.04	6.45	346.44	8.25
c. Egg distribution	17.85	0.28	12.76	0.30
d. Egg hatching	375.63	5.81	364.36	8.68
Total return from egg (B)	1263.20	19.55	858.53	20.44
C. Gross return (Tk./household/year)	6461.06	100.00	4199.66	100.00
D. Gross return (Tk./bird/year)	427.04		385.64	

Source: Field Survey, 2015

3.4 Profitability of chicken rearing

Profit from chicken rearing per household per year was accounted Tk. 4184.87 on Full cost basis, Tk. 5630.92 on variable cost and Tk. 5977.63 on cash cost basis in project household. Profit per chicken per year was accounted Tk. 276.60 on Full cost basis, Tk. 372.17 on Variable cost and Tk. 395.08 on cash cost basis in project household (Table 4). On the other hand, the net return per year was accounted Tk. 2649.87 on Full cost basis, Tk. 3595.37 on Variable cost and Tk. 3985.03 on cash cost basis for the non project household. Net return per chicken per year non project household was determined Tk. 243.33 on Full cost basis, Tk. 330.15 on Variable cost and Tk. 365.94 on cash cost basis. The above results supported from a study conducted by Natukunda et al., (2011) in Uganda where reported that the per indigenous chicken were profitable and the profit was found 5000 Ugandan shillings (UShs).

Table 4. Profitability from chicken rearing at household level

(Taka/Year)

Particular	Project	Non Project
A. Cost (Tk./household/year)		
Full cost/ Gross cost	2276.19	1549.79
Variable cost	830.14	606.29
Cash cost	483.43	214.62
B. Gross return (Tk./household/year)	6461.06	4199.66
C. Net return (Tk./household/year)		
Full cost (GR-GC)	4184.87	2649.87
Variable cost (GR-VC)	5630.92	3595.37
Cash cost (GR-CC)	5977.63	3985.03
D. Cost (Tk./bird/year)		
Full cost/ Gross cost	150.44	142.31
Variable cost	54.87	55.49
Cash cost	31.95	19.71
E. Gross return (Tk./bird/year)	427.04	385.64
F. Net return (Tk./bird/year)		
Full cost (GR-GC)	276.60	243.33
Variable cost (GR-VC)	372.17	330.15
Cash cost (GR-CC)	395.08	365.94
G. BCR (Undiscounted)		
Full cost	1.84	1.71
Variable cost	6.78	5.95
Cash cost	12.37	18.57

Source: Field survey, 2015

The undiscounted Benefit Cost Ratio (BCR) on basis of full cost, variable cost and cash cost was estimated 1.84, 6.78 and 12.37 respectively, in project household. The undiscounted BCR was calculated 1.71 on full cost basis, 5.95 on variable cost basis and 18.57 for cash cost basis in non-project household (Table 4). Miah (2002) reported BCR form chicken rearing was estimated 1.02, 1.55 and 5.17 on full cost, variable cost and cash cost basis. Sumy et al., (2010) showed that there was profitability with a Benefit Cost Ratio of 1.60 and 1.61 in two of the study areas. These results were supported by a study of Dutta et al., (2013) in Rajshahi and they found that the cost-benefit ratio was estimated at US$ 0.24 and US$ 0.19 per family and per bird respectively.

3.5 Functional analysis of profit in chicken rearing

In this section, an attempt has been taken to estimate the contribution of relevant factors on profit of chicken rearing within the framework of multiple regression profit model analysis.

Housing cost (X_1)

The calculated regression coefficient of housing cost was 0.214 and 0.230 respectively in project and non-project households (Table 5) indicating positive effect of money spent for housing on profit from chicken rearing. Increase in housing cost by a unit, on average, the profit from chicken rearing will increased by 0.214 and 0.230 units in project and non-project households, respectively if other things remaining the same. The contribution of housing cost in changing profit was statistically significant at 1.0% level in both project and non-project household.

Table 5. Estimate of profit function of chicken rearing

Variables	Project		Non Project	
	Coefficient of Regression	Level of significance	Coefficient of Regression	Level of significance
Constant	-2249.807***	0.004	-2419.064***	0.000
Housing cost	0.214***	0.000	0.230***	0.001
Labour cost	0.440***	0.000	0.496***	0.000
Feed cost	0.157***	0.003	0.091	0.174
Equipment cost	0.150***	0.012	0.069	0.293
Treatment cost	0.065	0.243	0.012	0.828
Transportation cost	0.194***	0.000	-0.376***	0.003
Market charge	-0.104**	0.056	0.430***	0.001
Age	-0.049	0.300	0.158**	0.022
Education	-0.041	0.338	0.060	0.261
Experience	0.018	0.689	-0.073	0.289
Bird number	0.144***	0.007	0.103	0.141
R2	0.865		0.758	
Adjusted R2	0.850		0.730	
F value	57.223***	0.000	27.558	0.000***

Note: ***(P<0.01), **(P<0.05), *(P<0.10)

Labour cost (X_2)

The regression coefficient of labour cost was 0.440 and 0.496 respectively in project and non-project households (Table 5) indicating positive effect of money spent for labour cost on profit from chicken rearing. If there is an increase in labour cost by a unit, on average, the profit from chicken rearing will increased by 0.440 and 0.496 units in project and non-project households if other things remaining the same. Labour cost significantly influenced on the profit of chicken rearing at 1.0% level in both project and non-project household.

Feed cost(X_3)

The regression coefficient of feed cost was 0.157 and 0.091 respectively in project and non-project households (Table 5) indicating positive effect of money spent for feed cost on profit from chicken rearing. If there is increase in feed cost by a unit, on average, the profit from chicken rearing will increased by 0.157 and 0.091 units in project and non-project households if other things remaining the same. The contribution of feed cost on the profit from chicken rearing was statistically significant at 1.0% in project household, but in non-project household the contribution of feed was insignificant.

Equipment cost (X_4)

The regression coefficient of equipment cost was 0.150 and 0.069 in project and non-project households (Table 5) indicating positive effect of money spent for equipment cost on profit from chicken rearing. Increase in equipment cost by a unit, on average, the profit from chicken rearing will increased by 0.150 and 0.069 units in project and non-project households if other things remaining the same. Influence of equipment cost on the profit from chicken rearing was statistically significant at 1.0% level in project household and in non-project household it was insignificant.

Treatment cost (X_5)

The regression coefficient of treatment cost was 0.065 and 0.012 respectively in project and non-project households (Table 5) indicating positive effect of money spent for treatment on the profit from chicken rearing. Increase in treatment cost by a unit, on average, the profit from chicken rearing will increased by 0.065 and 0.012 units in project and non-project households if other things remaining the same. The influence of treatment cost on the profit from chicken rearing was insignificant in both project and non-project household.

Transportation cost (X_6)

The calculated regression coefficient of transportation cost was 0.194 and -0.376 respectively in project and non-project households (Table 5) indicating positive effect of money spent for transportation on profit from chicken rearing in project household and negative effect in non-project household. Increase in transportation cost by a unit, on average, the profit from goat rearing will increased by 0.194 units in project household and will decreased by 0.376 units in non-project households if other things remaining the same. The contribution of transportation cost on the profit of chicken rearing was statistically significant at 1.0% level in both project and non-project household.

Market charge (X_7)

The calculated regression coefficient of market charge was -0.104 and 0.430 respectively in project and non-project households (Table 5) indicating negative effect of money spent for market charge on profit from chicken rearing in project household and positive effect in non-project household. Increase in market charge by a unit, on average, the profit from chicken rearing will decreased by-0.104 units in project household and increased by 0.004 units in non-project households if other things remaining the same. The effect of market charge on the profit from chicken rearing was statistically significant at 5.0% in project household and 1.0% level in non-project household.

Age (X_8)

The calculated regression coefficient of age was -0.049 and 0.158 respectively in project and non-project households (Table 5) indicating negative effect of age on the profit from chicken rearing in project and positive effect of age on non-project household. Increase in age by a unit, on average, the profit from chicken rearing will decreased by 0.049 units in project household and increased by 0.158 units in non-project households if other things remaining the same. The contribution of age on the profit of chicken rearing was statistically significant at 5.0% level in non-project household but insignificant in project household.

Education (X_9)

The calculated regression coefficient of education was -0.041 and 0.060 respectively in project and non-project households (Table 5) indicating negative effect of education on profit from chicken rearing in project household and positive effect in non-project household. Increase in level of education by a unit, on average, the profit from chicken rearing will decreased by 0.041 in project household and increased by 0.060 units in non-project households if other things remaining the same. The contribution of education on the profit from chicken rearing was insignificant in both project and non-project household.

Experience (X_{10})

The calculated regression coefficient of experience was 0.018 and -0.073 respectively in project and non-project households (Table 5) indicating positive effect of experience on profit from chicken rearing in project household and negative effect in non-project household. Increase in experience by a unit, on average, the profit from chicken rearing will increased by 0.018 units in project household and decreased by -0.073 units in non-project households if other things remaining the same. The effect of experience on the profit from chicken rearing was insignificant in both project and non-project household.

Bird number (X_{11})

The calculated regression coefficient of bird number was 0.144 and 0.103 respectively in project and non-project households (Table 5) indicating positive effect of bird number on profit from chicken rearing. Increase in chicken number by a unit, on average, the profit from chicken rearing will increased by 0.471 and 0.153 units in project and non-project households respectively, if other things remaining the same. The effect of bird number on the profit from chicken rearing was statistically significant at 1.0% level in project household, but in non-project household the effect of chicken number was insignificant.

F-values of the both equations were significant at 1.0% level implying that the variations in chicken farms depend mainly on the key explanatory variables included in the model. The value of coefficient of determination R2 were 0.865 and 0.758 in project and non-project household which indicated that both the multiple regression profit model were good fitted by the independent variables that were included in the two models.

4. CONCLUSIONS AND POLICY IMPLECATIONS

This section highlights the conclusions based on major findings of the study and draws some policy implications for further improvement of indigenous chicken production at household level. On the basis of above findings the following policies may be formulated for the improvement of indigenous chicken rearing to the rural people:

- Indigenous chicken production requires less space and investment and can therefore play an important role in improving the livelihood of the poor village family. Therefore focus should be given on indigenous chicken production system and utilization system to effectively utilize the resource.
- There is a knowledge gap and absent of scientific facility that is an obstacle in production of optimum level output.
- Judiciary use of inputs might be increased profitability of chicken producers.
- Financial support for housing is needed to protect the animals.
- Locally available superior breed should be selected for breeding and conservation of superior genetic materials.
- Department of livestock services should be more effective to reach the livestock services at the farmers door.
- Government should ensure supply of necessary vaccines for the chicken keepers.
- Training for farmers and extension staffs focusing on diseases control, improved housing feeding, breeding proper data recording system should be arranged to be successful in chicken production under village production system.
- Special program for breeding cock should be under taken.
- Financial support for the chicken keepers should be enhanced.
- Government should take initiative so that private sector may encourage contributing in indigenous livestock production services.
- There is a need to design and implement a national research program to collect, conserve and improve the indigenous goat and chickens in order to enhance the indigenous chicken production in the rural areas of the country.

REFERENCES

Braker, M. J. E., Udo, H.M.J, Webb, E. C. 2002. Impacts of intervention objectives in goat production within subsistence farming systems in South Africa. South African Journal of Animal Science, 32: 187-191.

Bishop, J. P. 1995. Chickens: Improving small-scale production. Echo technical note.

Chowdhury, S. D. 2014: Indigenous poultry: Need for policy intervention and sustainable approaches to higher productivity, Tropical Agricultural Research: 26.

Castellini, C., Berri, C., Bihan-Duval ELe, Martino, G. 2008. Qualitative attributes and consumer perception of organic and free-range poultry meat. World's Poultry Science Journal, 64:500 - 512.

Das, S.C., Chowdhury, S. D, Khatun, A., Isobe, N., Nishibori, M., Yoshimura, Y. 2008. Poultry production profile and expected future projection in Bangladesh. World's Poultry Science Journal, 64: 107-125.

Dolberg, F. 2004. "Review of Household Poultry Production as a Tool in Poverty Reduction with Focus on Bangladesh and India". In: Ahuja, V (Editor), *Livestock and Livelihoods: Challenges and Opportunities for Asia in the Emerging Market Environment*, National Dairy Development Board, India and Pro Poor Livestock Policy Facility (South Asia Hub) of FAO.

Dessie, T. 1996. Studies on village poultry production systems in the Central Highlands of Ethiopia, MSc. Thesis, Swedish University of Agricultural Sciences, Uppsala, Sweden.

Dutta, R. K., Islam, M. S., Kabir, M. A. 2013. Production Performance of Indigenous Chicken (Gallus domesticus L.) in Some Selected Areas of Rajshahi, Bangladesh. American Journal of Experimental Agriculture, 3: 308-323.

Farooq, M., Mian, M.A. 2001. Contribution of backyard chicken to household economy produced by non-member and member farmers of Women in Development (WID) under Sarhad Rural Support Program (SRSP) in Charsadda, Pakistan (a case study). Journal of Rural Development and Administration, 33: 89-97.

Farooq, M., Khurshid, A., Durrani, F.R., Chand, N., Gul, N., Ahmed, J., Asghar, A. 2002. Woman contribution to household economy through backyard chicken in Charsadda, Pakistan. Journal of Animal and Veterinary Advances, 1: 55-57.

Gueye EF 2003: Poverty alleviation, food security and the well-being of the human population through family poultry in low income food-deficit countries. Senegalese Institute of Agricultural research (ISRA), Dakar-hann, Senegal.